Meade® 12" and 14" LX200GPS Schmidt-Cassegrain Telescopes

Large apertures combined with a dazzling array of state-of-the-art LX200GPS features, including 145,000-object database, Zero Image-Shift Microfocuser, GPS Alignment, and High-Precision Pointing.

The large light-collecting apertures of Meade 12" and 14" LX200GPS telescopes enable levels of resolution and image brightness that satisfy the advanced requirements of the serious amateur, as well as those of many school or college research programs. The 12" model, for example, gathers 44% more light than Meade 10" Schmidt-Cassegrains; the 14" LX200GPS has 96% more light-collecting area than the 10" telescope.

Meade 12" and 14" LX200GPS Schmidt-Cassegrains include all of the features of the 8" and 10" models *(see pp. 32 - 37):* accurate GPS alignment; onboard 145,000-object database *(p. 33)* accessible in seconds through the Autostar II hand controller; 4-speed Zero Image-Shift Microfocuser; High-Precision Pointing to within one arc-minute; and much more. And yet, notwithstanding all of their high-performance features, Meade 12" and 14" LX200GPS telescopes are readily transportable for use in the field.

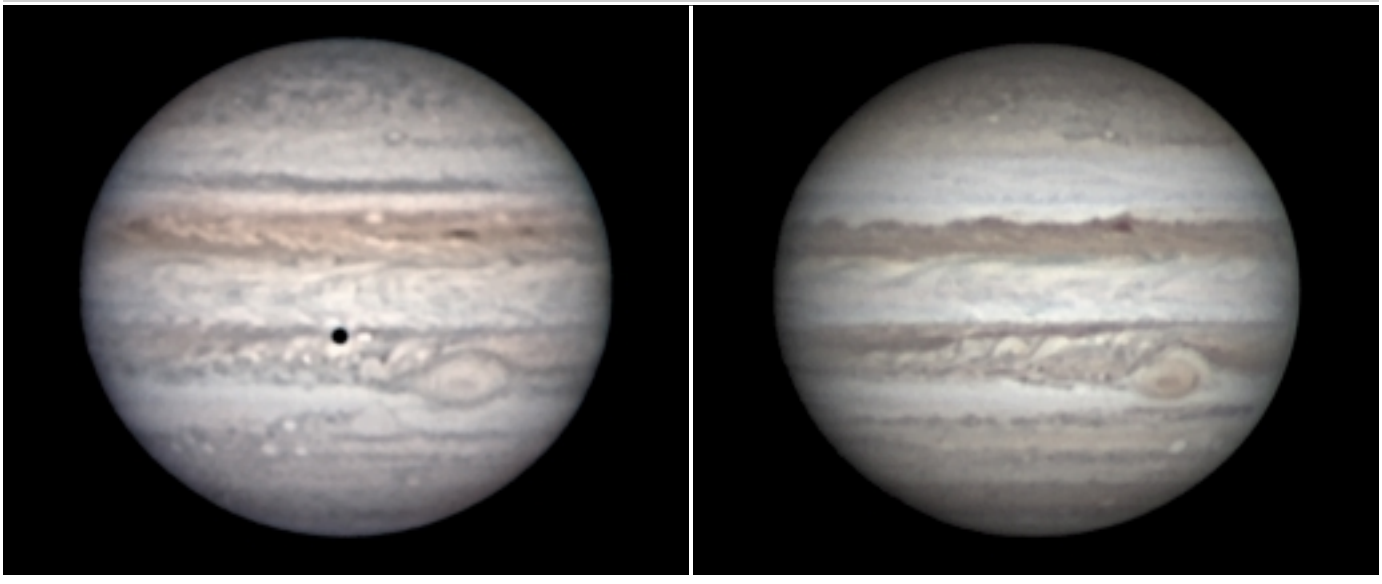
The telescopes' progressive-tension primary mirror lock, in conjunction with the Zero Image-Shift Microfocuser, cancels any residual image-shift during focusing. In addition the mirror lock results in even more precise long-distance GO TO slews of the telescope, since the large mass of the telescope's primary mirror is locked in position.

"We have been using Meade telescopes since our inception with remarkable success. We began with your 8-inch LX200 and now have one of your 12-inch LX200 models permanently mounted in our observatory. This instrument has proven to be extremely reliable and has allowed us to successfully conduct viewing opportunities for thousands of our Hawaii residents. It has also served us well for our 15 to 25 sections of astronomy classes we offer each academic year and has been an excellent research instrument for our undergraduate astronomy projects.

During November, 1997, a group of astronomers from Hopkins Observatory at Williams College in Massachusetts flew out to use our observatory for the occultation of the 10th-magnitude star Tycho 651672 by Neptune's 13th-magnitude satellite, Triton. The astronomers attached their imaging system to the 12-inch Meade LX200. The telescope acquired Neptune and resolved Triton easily; tracking was excellent. The entire system worked flawlessly. The 12-inch Meade LX200 successfully took 8000 images of Triton as it ran unattended, with the Hopkins imaging system attached, during the 17-minute occultation. We were the only observatory in Hawaii to get images of this event. Your company has enabled the small college to open a world of excitement, discovery, and meaningful undergraduate research at a cost easily within our reach." **— Fritz Osell, Director, Leeward Community College Observatory, Pearl City, Hawaii.**

Observing with the 12" LX200GPS: The advantage of large aperture immediately becomes apparent when observing with the 12" LX200GPS. Objects merely visible in smaller telescopes now take on new dimensions, with fainter, more tenuous nebular detail observable; the Orion Nebula grows to more than twice the area visible in an 8" telescope and with subtle color variations. Jupiter's surface is a web of interlocking structural detail, even under

Images of the planet Jupiter by Thierry Legault of Elancourt, France, with his Meade 12" Schmidt-Cassegrain telescope: *(left)* Showing Jupiter's satellite, Io, and Io's shadow, transiting the disc of the planet; Mr. Legault obtained this CCD image, a composite of 20 images exposed for 0.15-sec. at f/34 plus a set of RGB images, on January 5/6, 2002. *(right)* A composite of 960 images taken in a one-minute period with a Philips webcam attached to the 12" telescope on March 6, 2003. A Meade 2x Barlow lens was used to increase the telescope's effective focal length.



"The optics of my 12" LX200 are exquisite—in fact the best optics in a commercial catadioptric telescope that I have ever looked through. At 500X the Epsilon Lyrae double-double is not only clearly split into four components, but each of the four stars exhibits a textbook-perfect diffraction pattern, the ultimate test for superior optics." **— Jack Newton, Victoria, B.C., Canada.**

Meade 12" LX200GPS
Schmidt-Cassegrain
Telescope.

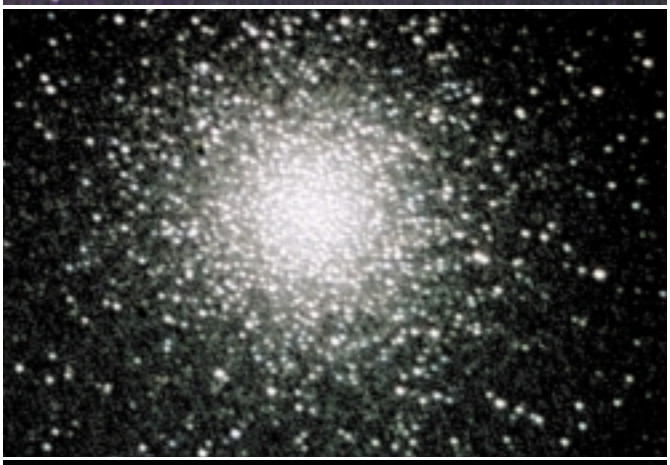
Meade 14" LX200GPS
Schmidt-Cassegrain
Telescope.

"Watching that huge 14" [LX200GPS] optical tube swing across the sky at 8 degrees per second and stop within arc-minutes of its target was almost a religious experience! …Jupiter's Red Spot was noticeably outstanding with clearly visible detail and a beautiful plasma pink color."
— Shelley R. Bonus, *Telescopes in Education,* Mt. Wilson, CA

moderate seeing conditions; shadowy detail on the surface of Jupiter's largest satellite, Ganymede, is often observable. With a limiting photographic magnitude of 17.5 (or over 18.0 if the telescope is equipped with the optional Meade **Ultra-High Transmission Coatings** group, p. 26), the 12" LX200GPS is a valuable tool in supernova patrols, in the plotting of faint asteroids, and in many other areas of significant astronomical research.

"We began our quest to CCD image the Arp Peculiar Galaxies on 11/02/01, using the 12" Meade LX200 located in the Astro Imaging Center next door to Powell Observatory in Louisburg, Kansas...Halton Arp used the 200" Hale telescope on Mt. Palomar to obtain [his original] photographic plates [of 338 Arp galaxies]. We were thrilled that with a 12" scope we could easily identify the Arp galaxies, and in some instances pick up significant detail and structure...we got some great images. We now [have] bagged almost 150 Arps. We accomplished in just a few nights what took Halton Arp months and a multi-million dollar telescope to accomplish." — ***from "Scoping Out Arp Peculiar Galaxies with a 12" Meade LX200 and SBIG ST-9E CCD Camera"*** **by Bill Boyle and Tim Kristi;** ***The Reflector*** **of The Astronomical League,** ***August, 2002.***

The 12" LX200GPS follows in the path of its predecessor, the Meade 12" LX200, a telescope installed in hundreds of school and college observatories worldwide and the choice of thousands of amateur astronomers. It is an instrument which leaves very little to be desired.



(above, top to bottom) **Meade 12" LX200 images:** the **Helix Nebula (NGC 7293),** a CCD image by Tim Puckett; **Globular Cluster (M3) in Canes Venatici** and **Galaxy (NGC 4565) in Coma Berenices,** CCD images by Joe Petrick**.**

(left) **Meade 12" LX200GPS and 14" LX200GPS Schmidt-Cassegrain telescopes.**

(right) **A high-resolution CCD image of the Moon** by Thierry Legault with the Meade 12" Schmidt-Cassegrain, showing the region of adjoined craters Cyrillus and Theophilus; exposure time 1/15-sec.

A 12" LX200 photo of the Southern Highlands region of the Moon (with the crater Maurolycus at bottom-center) by Christian Arsidi using Kodak 2415 film.

"...Wouldn't it be great if we could image the finest possible detail on Jupiter or the hairline divisions in Saturn's rings even on nights of moderate atmospheric turbulence? Well, we can. Department-store technology is all it takes to assemble an imaging system that removes the twinkle from stars and fuzziness from planets. All this method requires is a telescope with excellent optics, some off-the-shelf video and computer equipment, and a bit of patience.

My results have consistently exceeded expectations. With a Meade 12-inch Schmidt-Cassegrain telescope in moderate turbulence I regularly resolve features at the Dawes limit of 0.4 arcsecond. I can even do this in a solar-heated and normally more turbulent daytime sky. [Images of the Space Shuttle in orbit] clearly show the wings, cargo-bay doors, and even the cockpit windows. [See p. 19.] I have also resolved Mir's solar panels and modules, even when the space station was hundreds of kilometers away. Images of bright stars reveal diffraction rings both day and night, and planetary details are extraordinary...." **— from the article *Sharper Images Through Video* by Ron Dantowitz in *Sky & Telescope,* August, 1998.**

Specifications: 12" and 14" LX200GPS Telescopes—Includes 12" Schmidt-Cassegrain (D = 305mm, F = 3048mm, f/10) or 14" Schmidt-Cassegrain (D = 356mm, F = 3556mm, f/10) optical tube assembly with MgF_2 coatings on the correcting lens and standard aluminum coatings on the primary and secondary mirrors (Ultra-High Transmission Coatings, p. 26, available optionally); primary mirror lock; 4-speed Zero Image-Shift Microfocuser; heavy-duty fork mount, with 4"-diameter polar ball bearing, dual-axis 5.75" worm gears, and 7-port multi-function control panel, including two RS-232 serial interface ports; manual and electric slow-motion controls on both axes; setting circles in RA and Dec; Autostar II control system with 3.5-Megabyte flash memory, digital readout display, permanently-programmable Smart Drive and 185-speed drive controls on both axes, High-Precision Pointing, and 145,000-object onboard celestial software library; GPS alignment system with 16-channel GPS receiver, magnetic declination compensation, and true-level and North electronic sensors; 12v DC telescope power supplied from internal battery compartments accepting 8 (user-supplied) C-cells (optional 25 ft. cords are available for powering from auto cigarette lighter plug or from 115v AC); 8 x 50mm viewfinder; 2" diagonal mirror with 1.25" adapter; Series 4000 Super Plössl 26mm eyepiece; vibration isolation pads (14" only); variable-height giant field tripod; operating instructions.

Specifications and Features: 12" and 14" LX200GPS Telescopes

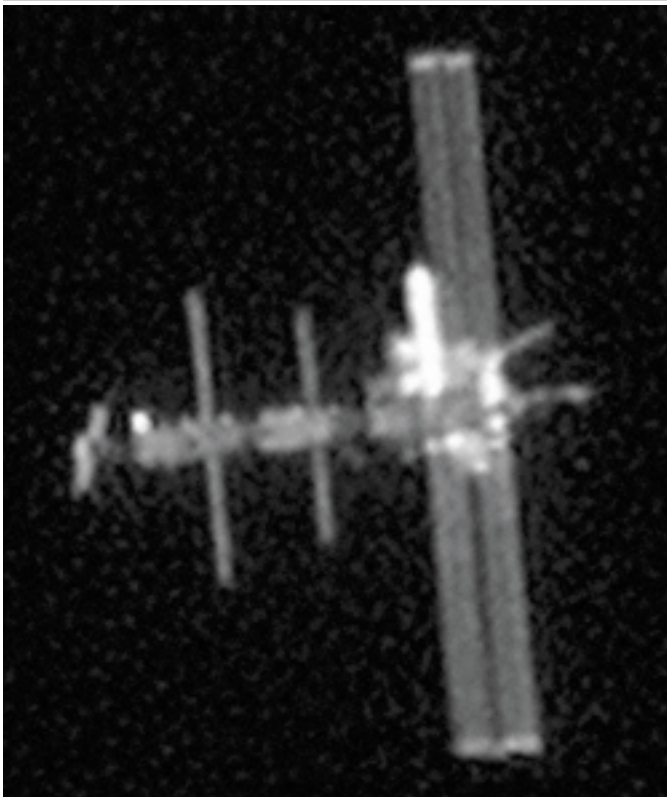
Optical Design	Schmidt-Cassegrain
Clear Aperture;	305mm (12"); 356mm (14")
Primary Mirror Diameter	314mm (12.375"); 370mm (14.57")
Focal Length; Focal Ratio	3048mm f/10 (12"); 3556mm f/10 (14")
Near Focus *(approx.)*	75 ft. (12"); 100 ft. (14")
Resolving Power (arc secs.)	0.38 (12"); 0.32 (14")
Optical Coatings	MgF_2 on correcting plate (2-sides); standard aluminum on primary & secondary mirrors
Ultra-High Transmission Coatings *(p. 26)*	optional at time of purchase
Limiting Visual Magnitude *(approx.)*	15.0 (12"); 15.4 (14")
Limiting Photographic Magnitude *(approx.)*	17.5 (12"); 18.5 (14")
Image Scale (degs./inch)	0.48 (12"); 0.40 (14")
Maximum Practical Visual Power	750X (12"); 850X (14")
35mm Angular Film Coverage	0.45° x 0.65° (12"); 0.39° x 0.56° (14")
Optical Tube Dimensions (dia. x length)	13.6" x 25" (12"); 15.8" x 31" (14")
Secondary Mirror Obstruction (dia.; %)	4.0"—11.1% (12"); 4.9"—12.4% (14")
Telescope Mounting	heavy-duty fork type; double tine
Setting Circle Diameters	Dec.: 5"; RA: 8.75"
RA and Dec. Control Systems	*both axes:* 185-speed, microprocessor-controlled, 12v. DC servo motor; 5.75" LX worm gear with Smart Drive software
Primary Mirror Lock	included (progressive tension)
Zero Image-Shift Microfocuser	included (4-speed)
GPS Alignment	included (16-channel GPS receiver, electronic sensors for true-level and North, with magnetic declination compensation)
GO TO Pointing Precision *(approx.)*	2-arc mins. (1-arc min. in HP-mode)
Slew Speeds, RA and Dec.	0.01x to 1.0x sidereal, variable in 0.01x increments; 2x, 8x, 16x, 64x, 128x sidereal; 1°/sec. to 8°/sec., variable in 0.1° increments
Tracking Rates	sidereal, lunar, or custom-selected from 2000 incremental rates
Hemispheres of Operation	North and South, selected by GPS or user
Slow-Motion Controls	manual and electric, RA and Dec.
Bearings	Dec.: 3 x 1.83" dia. ball bearings; RA: 1 x 4" dia. and 1 x 2.25" dia. ball bearings
Autostar II Hand Controller	Atmel 89C451 & PIC16C57 microcontrollers; 2 line x 16 alphanumeric character display; 20-button keypad, red LED backlit
Main Telescope Controller	distributed intelligence architecture using 8 networked microcontrollers (Motorola 68HC11, Atmel 89C451, 3 x PIC16C62, 2 x PIC16C54, Sony digital signal processor); 3.5-Megabyte flash memory, field reprogrammable, 32K RAM
Batteries; Battery Life *(approx.)*	8 x C-cells (user-supplied); 20 hrs.
Onboard Celestial Object Database	147,541 objects
Field De-Rotator *(optional)*	#1220
Materials: **Tube Body; Mount Castings**	aluminum; aluminum
Primary & Secondary Mirrors	Pyrex® glass, grade-A, fine-annealed
Correcting Plate	clear float glass
Giant Field Tripod, height	40" - 50" variable
Superwedge *(optional)*	38 lbs. (12"); 40 lbs. (14")
Superwedge Latitude Range	24° - 65°
Telescope Dimensions, swung up	15" x 20" x 37" (12"); 17" x 24" x 44" (14")
Total Net Telescope Weight, with tripod	125 lbs. (12"); 166 lbs. (14")
Total Shipping Weight *(approx.),* **including optical tube, fork mount, and giant field tripod**	150 lbs. (12"); 225 lbs. (14")

Observing with the 14" LX200GPS: With a resolving power of 0.32 arcseconds, the Meade 14" Schmidt-Cassegrain is an advanced instrument capable of serious research. When equipped with the optional Ultra-High Transmission Coatings group *(p. 26),* the telescope presents an image brightness fully equivalent to that of a 15" telescope with standard coatings.

Observing with the Meade 14" Schmidt-Cassegrain is an extraordinarily rewarding experience. The advantages of the telescope's large diffraction-limited aperture are immediately apparent, particularly to the advanced observer with an eye trained to discern extremely fine detail on the full range of celestial phenomena – lunar, planetary, and deep-space. Studies of the more obscure Messier and NGC objects such as the planetary nebula NGC 3242 in Hydra, the spiral galaxy M100 in Coma Berenices, and the open cluster NGC 6231 in Scorpius, show a heightened level of resolution invisible in smaller telescopes. Difficult objects like the Crab Nebula (M1) in Taurus, the Spiral Galaxy (M33) in Triangulum, and the Owl Nebula ((M97) in Ursa Major begin to show their essential structures under high-power visual observation; these same objects present magnificently detailed images as the subjects of long-exposure CCD or film cameras.

Under favorable atmospheric conditions binary stars may be resolved to the telescope's theoretical limit, and, just as importantly, the telescope's high-contrast internal mirror baffling allows for the resolution of a large number of binaries where the brightness of the primary far exceeds that of the secondary. Note in the 14" telescope the subtle shadings of Saturn's inner ring structure, as well as the varying contrast levels of the cloud belts and the small polar cap on the planet's surface. Jupiter's cloud belts reveal a tremendous range of color shadings, as well as whirls,

Image of the International Space Station (ISS), taken with a Meade 12" Schmidt-Cassegrain telescope. Ron Dantowitz and Marek Kozubal of the Clay Center for Science and Technology at Dexter and Southfield Schools, Brookline, Mass., obtained this daytime image, a composite of 20 video frames, on September 10, 2002, when the ISS was at a height of 260 miles above the earth.



For placement of Meade 12" and 14" LX200GPS telescopes in the equatorial mode, 12" and 14" Superwedges are available.

"…After the weather cleared, I had the chance to thoroughly test out the 14" LX200GPS Schmidt-Cassegrain, doing dozens of GO TO's over a period of several hours…First, my overall conclusion: this is one awesome telescope! By now Meade optics are assumed to be diffraction-limited, and the 14" is no exception. Intrafocal and extrafocal stellar images are virtually identical; subtle variations in contrast (such as on the surface of Jupiter's largest satellite, Ganymede) are readily identifiable; and thanks to the enhanced [UHTC] coatings, images are significantly brighter than in other 14" telescopes I have used…The telescope easily passed all of the usual double-star tests for superior optics.

In deep-space the telescope provided a simply stunning experience. The Whirlpool Galaxy (M51) stood out in clear detail with its spiral arms and satellite galaxy (NGC 5195) well-defined. The ninth-magnitude galaxy M94 was an easy object; the bright, dense nucleus of the galaxy contrasted nicely with the fainter, wispy outer regions. The Hercules globular cluster (M13) was magnificent, as expected, but what surprised me was the quantity of stars that are now resolvable in the telescope. In a true test of the telescope's light grasp, I was able to see, using averted vision, the magnitude-15.4 central star of the Ring Nebula (M57) in Lyra.

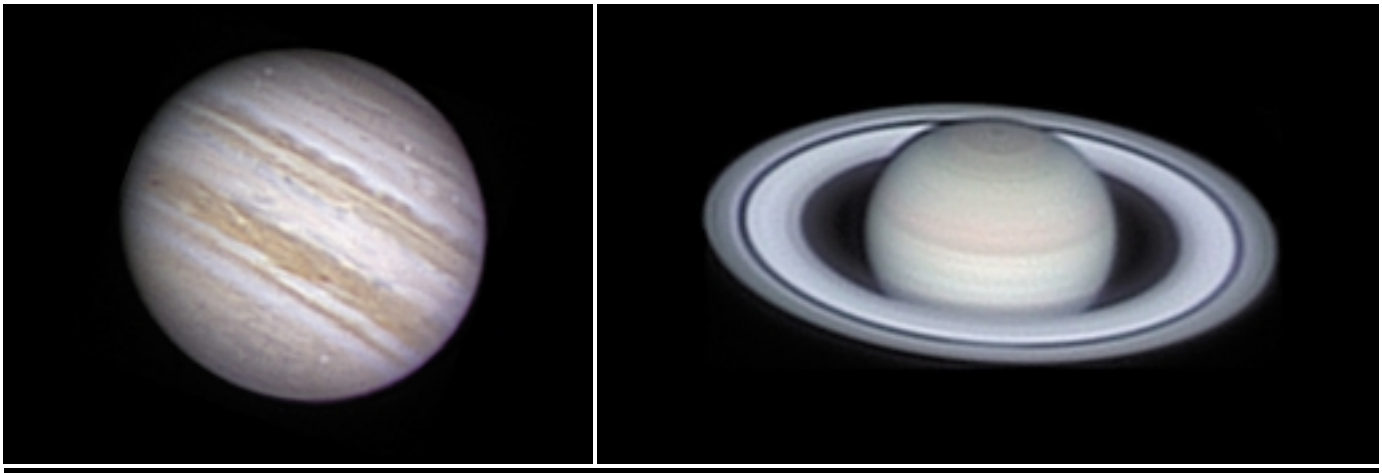
I topped off my evening session at the telescope by observing Jupiter and Saturn at high powers. At 367X Jupiter exploded into a mass of detail — wave-like belt structures, colors, and knots of just superb resolution…when the seeing improved later in the evening, I added a Barlow to up the magnification to 734X. Still the image maintained absolute clarity and definition. During moments of super-seeing I glimpsed Saturn's Encke Division (less than 0.10 arcseconds wide). The 14" is definitely a superb planetary instrument. In the short time that I have used it I could write a book on the visual capabilities of the telescope. I truly believe that in the 14" LX200GPS you have created a world-class research telescope." **—Egon Reich II, Ph.D., Costa Mesa, CA.**

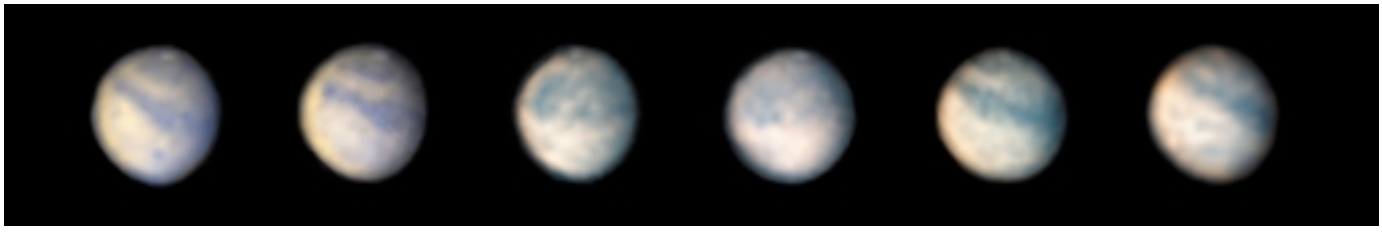
festoons, and discontinuities almost too numerous to count. Observation of transits of Jupiter's four primary satellites across the disc of the planet, and of the shadows of these satellites on the planet, is routine. Even at distant oppositions Mars displays significant surface detail; at close oppositions the planet becomes a mass of intricately-connected dark plains and ochre-colored deserts.

The Meade 14" LX200GPS includes an all-new fork mounting of uncommon structural rigidity. For added strength and stability the fork's polar cross-bar assembly is cast in one continuous piece from one fork arm to the other; the motor drive base includes a thickened cast floor to minimize flexure of the telescope when mounted on the optional Superwedge at low latitudes. The mounting combines with the Autostar control system for long-distance slews across the skies to locate targets to a precision of within a few arcminutes. The mounting, Autostar, and the telescope's research-class optics make the 14" LX200GPS the perfect choice for the visual observer or imaging specialist looking to explore new astronomical frontiers.

"The Meade 14" LX200GPS combines all the attributes in a telescope that we seek in our public outreach programs: high-performance, large-aperture optics; extremely precise GO TO automatic pointing; and a rigid fork mounting fully up to the tasks of long-exposure CCD imaging and astrophotography. Please pass along our congratulations to your engineering and optics departments for a job very well done." **—Sheryl D. Johnson and Debbie Searle, *Adventures in Astronomy,* Laguna Niguel, Calif.**

"I have nothing but praise for my Meade 12" LX200. It has provided me with very fine images of the planets, my special area of study, and operated without fault for five years. Planetary observing is probably the most demanding area of amateur study for any instrument, as the telescope must have optics of exceptionally high quality. The 12" LX200 provides detailed visual and CCD images of Mars even when the planet is far from opposition, a wealth of fine detail on Jupiter and Saturn, and memorable observations of binary stars and globular clusters. I would recommend (and have recommended!) without hesitation the 12" LX200 to advanced amateurs seeking a truly high-performance telescope that can quite literally do it all." **— Damian Peach, Assistant Director of the Jupiter/Saturn Sections of the British Astronomical Association, Rochester, Kent, U.K.; Jupiter Section, Association of Lunar and Planetary Observers.**





Damian Peach obtained this remarkable series of CCD images with his Meade 12" LX200 Schmidt-Cassegrain telescope. *(clockwise from upper left)* (1) **The planet Venus.** (2) A high-resolution color image of **Jupiter's largest satellite, Ganymede;** the clearly-identifiable marking on Ganymede's surface is the so-called *Nicholson Regio*, a dark plain discovered by the Voyager spacecraft; this image of February 16, 2002, a composite of 28 frames, was taken when the satellite subtended an angle of only 1.6-arcseconds to the earth. (3) **The planet Saturn,** October 31, 2002; note the small (1200-mile diameter) south polar cap and the Encke Division. (4) Mr. Peach obtained this series of **Mars** images in February-March, 2002, when the planet was less than 5 arcseconds in angular diameter; despite the planet's small apparent diameter, all of its prominent features are identifiable in these color images. (5) **The planet Jupiter,** October 13, 2000.

“Images close to optical perfection…”

Over the past ten years Meade Schmidt-Cassegrain owners throughout the world have pushed the resolution of their photographic and CCD images closer and closer to ultimate professional standards — standards set by professional astronomers using telescopes with costs measured in the millions of dollars. Thierry Legault of Elancourt, France, with his Meade 12" Schmidt-Cassegrain telescope is one of the leaders of an elite group which has made quantum leaps in imaging resolution of the Moon and planets. In the January, 1999, issue of the leading French astronomy magazine *Ciel et Espace [Sky and Space]*, Editor-in-Chief Serge Brunier wrote, referring to the images reproduced on these pages:

“Thierry Legault takes his images with a Hi-SIS 22 CCD camera installed at the focus of a Meade 305mm [12" Schmidt-Cassegrain] telescope.... *[He] has changed with his 305mm telescope and his CCD camera, all the standards of astronomical imaging.*

His images of the sky, of an unprecedented sharpness, seem to come from a mountain observatory.... In the opinion of his peers, his images of the Moon and the planets have no equivalent throughout the world. The sharpness of these electronic images is equivalent to those of the best photographs obtained in recent decades at the Pic du Midi and Catalina Observatories…

Visible during the first and last quarters, the area of the craters Hyginus and Triesnecker is one of the most spectacular on the Moon. The fine rilles which cover the lunar surface are often used as an optical test by astrophotographers. Here is, to our knowledge, the sharpest image of these crevasses ever obtained.

[Referring to images of Jupiter shown here] Images close to optical perfection.... On Jupiter too, Thierry Legault has placed the bar very high....The resolution of these images is exceptional for a 305mm telescope.... [The images of Jupiter, below, with] the passage of Io in front of the disk of the planet. Shots formerly within the range only of professionals.”

— reprinted with permission, *Ciel et Espace.*

CCD images with a Meade 12" Schmidt-Cassegrain telescope by Thierry Legault *(clockwise from lower-left):* Jupiter, showing transit of its satellite Io, and Io’s shadow, across the planet’s disc; Jupiter, with the Great Red Spot crossing the planet’s meridian; vicinity of the lunar craters Hyginus and Triesnecker; region of the Straight Wall on the Moon.